WHAT IS CLAIMED IS:

1. A system comprising:
a plurality of data storage drives; and
a controller coupled to each of the data storage drives;
wherein the controller is configured to power on a first subset of the data storage drives and to power off a second subset of the data storage drives, and wherein each of the first and second subsets contains at least one of the data storage drives.

2. The system of claim 1, wherein the plurality of data storage drives comprise a single RAID set of data storage drives.

3. The system of claim 1, wherein the first subset comprises at least one data storage drive in a first RAID set and the second subset comprises at least one data storage drive in the first RAID set.

4. The system of claim 1, wherein each of the plurality of data storage drives is individually controllable to power the data storage drive on or off, independent of the remainder of the plurality of data storage drives.

5. The system of claim 1, wherein the data storage drives comprise hard disk drives.

6. The system of claim 5, wherein the system comprises a RAID system.

7. The system of claim 5, wherein the system comprises multiple shelves, wherein each shelf comprises multiple subsets of data storage drives.

8. The system of claim 7, wherein the system comprises one or more RAID sets of data storage drives and wherein each of the one or more RAID sets of data storage drives comprises data storage drives from at least two of the shelves.

9. The system of claim 7, wherein the controller comprises a rack controller connected to a plurality of shelf controllers, wherein each shelf controller is configured to control a set of data storage drives on a corresponding shelf.

10. The system of claim 7, wherein the data storage drives are contained in a single physical enclosure.

11. The system of claim 1, wherein the data storage drives comprise optical disk drives.

12. The system of claim 1, further comprising one or more parity drives, each of which is associated with a corresponding RAID set of the plurality of data storage drives.

13. The system of claim 12, wherein the system is configured to compute parity information for the RAID set by XOR'ing an old parity value with a value currently written to one of the data storage drives in the RAID set to generate a current parity value, and storing the current parity value on the parity drive.

14. The system of claim 12, wherein the one or more parity drives are always powered on.

15. The system of claim 1, further comprising one or more metadata drives, each of which is associated with a corresponding group of the plurality of data storage drives.

16. The system of claim 15, wherein the system is configured to store metadata information on the metadata drive, wherein the metadata comprises a mapping of logical addresses for the system to physical addresses for the corresponding group of .data storage drives.

17. The system of claim 15, wherein the system is configured to store metadata information on the metadata drive, wherein the metadata comprises health information for the corresponding group of .data storage drives.

18. The system of claim 15, wherein the system is configured to store metadata information on the metadata drive, wherein the metadata comprises data which duplicates a portion of each of the corresponding group of .data storage drives.

19. The system of claim 15, wherein the one or more metadata drives are always powered on.

20. The system of claim 1, wherein the first subset comprises no more than a predetermined fraction of the plurality of data storage drives.

21. The system of claim 1, wherein the predetermined fraction is a function of a failure rate of individual data storage drives, a minimum required service period, and a total number of data storage drives in the system.

22. The system of claim 21, wherein the predetermined fraction is equal to f/{1 – (1 – 1/T)**1/N}, where f is a mean time between failures of an individual data storage drive, T is a minimum required service period, and N is the total number of data storage drives in the system.

23. A method comprising:

providing a data storage system having a plurality of data storage drives;

performing data accesses to the data storage system, wherein the data accesses involve accesses to a first subset of the data storage drives, wherein the first subset of the data storage drives is powered on; and

powering down a second subset of the data storage drives, wherein the data accesses do not involve accesses to the second subset of the data storage drives.

24. The method of claim 23, wherein the plurality of data storage drives comprise a single RAID set of data storage drives.

25. The method of claim 23, wherein the first subset comprises at least one data storage drive in a first RAID set and the second subset comprises at least one data storage drive in the first RAID set.

26. The method of claim 23, wherein each of the plurality of data storage drives is individually controlled to power the data storage drive on or off, independent of the remainder of the plurality of data storage drives.

27. The method of claim 23, wherein performing data accesses to the data storage system comprises accessing a block of storage that spans a first data storage drive and a second data storage drive, wherein as the first data storage drive is accessed, the first data storage drive is powered on and the second data storage drive is powered off, and as the second data storage drive is accessed, the second data storage drive is powered on and the first data storage drive is powered off.

28. The method of claim 27, further comprising, if the data accesses comprise writes, caching data for the second data storage drive as the second data storage drive is transitioned from a powered off state to a powered on state.

29. The method of claim 27, further comprising, if the data accesses comprise reads, retrieving data corresponding to the second data storage drive from a metadata volume as the second data storage drive is transitioned from a powered off state to a powered on state.

30. The method of claim 23, wherein performing data accesses to the data storage system comprises accessing one or more data storage drives and corresponding parity drives.

31. The method of claim 30, further comprising computing parity information for a RAID set by XOR'ing an old parity value with a value currently written to one of the data storage drives in the RAID set to generate a current parity value, and storing the current parity value on the parity drive.

32. The method of claim 23, wherein performing data accesses to the data storage system comprises accessing one or more data storage drives and corresponding metadata drives.

33. The method of claim 32, wherein accessing the metadata drives comprises storing metadata information on the metadata drive, wherein the metadata comprises health information for the corresponding group of .data storage drives.

34. The method of claim 32, wherein accessing the metadata drives comprises storing metadata information on the metadata drive, wherein the metadata comprises

data which duplicates a portion of each of the corresponding group of .data storage drives.

35. The method of claim 32, further comprising refreshing data on the one or more data storage drives based on information stored on the metadata drive.

36. The method of claim 23, wherein the first subset comprises no more than a predetermined fraction of the plurality of data storage drives.

37. The system of claim 36, wherein the predetermined fraction is a function of a failure rate of individual data storage drives, a minimum required service period, and a total number of data storage drives in the system.

38. The method of claim 37, wherein the predetermined fraction is equal to f/{1 – (1 – 1/T)**1/N}, where f is a mean time between failures of an individual data storage drive, T is a minimum required service period, and N is the total number of data storage drives in the system.

39. The method of claim 23, further comprising replacing one or more data storage drives that are in the second subset.